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AUSTRALIA

Form 1

PATENT APPLICATION FORM (NON CONVENTION)

AUSTRALIA

Patents Act 1952-1973

APPLICATION FOR A PATENT

(a) Insert full name(s) of applicants.

I/We(a) NOEL CLAIR 62137/80

COMPLETE AFTER PROVISIONAL SPECIFICATION No. 62137/80

(b) Insert address(es) of applicant(s).

of(b) 3 CRAIGNAIR CLOSE, WALLSEND. N.S.W. 2285

(c) Insert title of invention.

hereby apply for the grant of a Patent for an invention entitled (c) "APPARATUS FOR THE MANUFACTURE OF FRAME COMPONENTS"

which is described in the accompanying provisional ~~complete~~ specification.

My/~~Our~~ address for service is: C/c Arthur S. Cave & Co., Patent Attorneys, 1 Alfred Street, Sydney, 2000, in the State of New South Wales, Australia.

(d) Insert date Form signed.

DATED this (d) 6th day of SEPTEMBER, 19 79

(e) Signature(s) of applicant(s). If a company to be executed in a manner binding on the company (according to its Articles of Association).

(e) NOEL CLAIR

(f) Seal, if any.

(f)

To.

THE COMMISSIONER OF PATENTS.

ARTHUR S. CAVE & CO.
PATENT AND TRADE MARK ATTORNEYS
SYDNEY

COMMONWEALTH OF AUSTRALIA

"Patents Act 1952

Form 7

DECLARATION IN SUPPORT OF AN APPLICATION FOR A PATENT OR PATENT OF ADDITION

(a) Insert full name(s) of applicants

In support of the Application made by (a) NOEL CLAIR

62137/80

for a patent ~~XXXXXXXXXXXXXX~~ for an invention entitled: (b)

(b) Insert title of invention

"APPARATUS FOR THE MANUFACTURE OF FRAME COMPONENTS"

(c) Insert full name(s) of declarant(s).

I, (c) NOEL CLAIR

(d) Insert address(es) of declarant(s)

of (d) 3 CRAIGNAIR CLOSE, WALLSEND. N.S.W. 2285

do solemnly and sincerely declare as follows:

1. I am the applicant for the patent ~~XXXXXXXXXXXXXX~~

~~((Or, in the case of an application by a body corporate,)~~

(e) Insert name of body corporate.

~~1. I am authorized by (e)~~

~~the applicant for the patent / patent of addition to make this declaration on its behalf.~~

2. I am the actual inventor of the invention.

~~((Or, where a person other than the inventor is the applicant,)~~

(f) Insert full name(s) of actual inventor(s).

~~2. (f)~~

(g) Insert address(es) of actual inventor(s).

~~of (g)~~

~~is the actual inventor of the invention and the facts upon which I am / the is entitled to make the application are as follows: (h)~~

(h) Set out how applicant(s) derive(s) title from actual inventor(s), i.e. assignee of the invention from the actual inventor(s).

Declared at SYDNEY this 6th day of SEPTEMBER, 1979.

.....

(Signature of Declarant)

To:

NOEL CLAIR

The Commissioner of Patents,
COMMONWEALTH OF AUSTRALIA

ARTHUR S. CAVE & CO.
PATENT AND TRADE MARK ATTORNEYS

(12) PATENT ABSTRACT (11) AU-A1-62 137/80
(19) AU

(54) FORMING CHANNEL SECTION BUILDING FRAME COMPONENTS

(75) CLAIR, N.

(21) 62,137/80 (22) 7.9.79 (23) 8.9.80 (24) 7.9.79
(43) .9 . 81
(51)[3] B21D 5/08 B21D 28/32 B21H 8/00
(74) CA

(57) Claim

1. Apparatus for forming channel section building frame components from flat metal strip comprising a series of forming rolls for rolling a strip into the desired cross-sectional formation, a parting station which parts a predetermined length of said material from the continuous length travelling through the forming rolls, a perforating station located between the forming rolls and the parting station and a control mechanism for causing the forming rolls and the station to operate in a desired sequence.

COMMONWEALTH OF AUSTRALIA

Form 10
Regulation
13(2)

PATENTS ACT, 1952

COMPLETE SPECIFICATION

(ORIGINAL)

FOR OFFICE USE

Short Title:

Int. Cl:

Application Number:

Lodged:

Complete Specification-Lodged:

Accepted:

Lapsed:

Published:

Priority:

Related Art:

TO BE COMPLETED BY APPLICANT

Name of Applicant: NOEL CLAIR

Address of Applicant: 3 Craignair Close, Wallsend, New South Wales, 2285, Australia

Actual Inventor: NOEL CLAIR

Address for Service: ARTHUR S. CAVE & CO., Patent and Trade Mark Attorneys, 1 Alfred Street, Sydney, New South Wales, Australia, 2000.

Complete Specification for the invention entitled:

APPARATUS FOR THE MANUFACTURE OF FRAME COMPONENTS

The following statement is a full description of this invention, including the best method of performing it known to me:-

---

This invention concerns forming apparatus for manufacturing the frame components of buildings.

The building industry now commonly constructs single and double storey dwellings by first constructing a frame or shell made from several rectangular walls, each wall being constructed in a manner analogous to a wooden wall of plates, studes and noggins with the difference that the metal counterparts are of channel section. Several systems have been proposed, some have been utilised and one such system is described in Patent No. 484003 and sold under the trade mark SPEEDYLOK. That system relies upon two basic components that is a plate and a stud. Both are of channel section and the floor of the plate has pairs of slots punched in the floor of the section to receive a pair of corresponding tongues projecting from the ends of a stud. Both ends of each stud are swaged inwardly to reduce the section of the stud so that this may be received by the top and bottom plates while still maintaining an overall planar surface for the attachment of exterior siding and interior plasterboard. These components must therefore be rolled specially, cut to length, swaged where necessary and then perforated in such positions as will allow square frames to result from their assembly. This mode of manufacture requires several process steps each performed on a separate machine and in consequence the risk of error and the resulting wastage is a problem. So too is the accommodation of several machines which require

proper shop layout and staff sufficiently skilled to turn out components of the correct length and correct number. Another earlier system relied upon similar components but the studs were not swaged at their ends but made smaller in width to fit between the sides of the plate.

This invention seeks to provide a compact machine where the risk of error in production is reduced.

This invention provides apparatus for forming channel section building frame components from flat metal strip comprising a series of forming rolls for rolling strip into the desired cross-sectional conformation, a parting station which parts predetermined length of said material from the continuous length travelling through the forming rolls, a perforating station located between the forming rolls and the parting station and a control mechanism for causing the forming rolls and the stations to operate in a desired sequence.

The forming rolls are arranged in pairs and may be driven by an intermittent motion device. The chief difficulty in operating a machine with an indexed feed supplied through a series of nip rolls is that equal numbers of revolutions of the rolls frequently produces different feed distances in the material. This is an unacceptable result in a machine of this type which must produce precise components. Even small quantities of slip eventually aggregate to produce error in the products. Accordingly a train of pairs of forming rolls may be driven by an intermittent motion device, the train including an input

end pair, an output end pair and at least one intermediate pair, the drive from the intermittent motion device being coupled to said intermediate pair or one of the intermediate pairs, and the remaining roll of pairs being driven from the intermediate pair.

Preferably each roll includes a central driven section which defines a nip with the corresponding central section of the roll pair, and two idling forming flanges, one at each end of the section, which flanges are not driven. The driven section of the intermediate roll pair which is coupled to the intermittent motion device, may be axially serrated. Only one roll of each pair may be driven.

The intermittent motion device may have means to disengage the drive from the device to the forming rolls and may include a rachet wheel which is rotated by the feed motion of a feed pawl in turn supplied by eccentric motion from a main drive, said feed pawl being movable under the influence of the control mechanism between a feed position in which it rotates the rachet wheel and a dwell position in which the feed pawl is held clear of the rachet wheel allowing the eccentric motion to continue. A check pawl may co-operate with the rachet wheel to prevent backlash when the feed pawl is disengaged.

The perforator station may include a reciprocating die and an override for cancelling the perforation action while allowing the reciprocating motion to continue. The perforator die may comprise a static die, a reciprocal die and a reciprocal platen for applying punching pressure to

the reciprocal die, said platen having a die cavity and being movable by the control mechanism between a cancel position in which the die registers with the cavity and a punch position in which the platen drives the die.

The control mechanism may include a dial wheel which is rotatable step wise synchronously with the intermittent advance of the material, a pin locatable at any one of a number of positions around the wheel circumference which correspond to lengths of through put of material, a switch operable by said pin to activate a parting tool and a wheel return mechanism for returning the wheel to start at the end of the parting operation. This is achieved by provision of a slidable shaft carrying the dial wheel, a pinion on the shaft spaced from the dial wheel, a rachet wheel co-axial with the shaft being rotatable by a dial feed pawl which receives feed motion synchronous with the motion of the intermittent motion device and a shaft slider for moving the shaft between an index position wherein the dial wheel is in driving connection with the rachet wheel and a recovery position wherein the dial wheel is disengaged from the rachet wheel but is under the influence of a driven rack strip which meshes with the pinion and returns the drive wheel to a restart position. The switch referred to may be a valve forming part of the control mechanism which provides a signal for the disengagement of the feed pawl supplying intermittent feed to the material, the initiating of the parting operation and where appropriate the interruption of the perforating operation.

The parting station may include a reciprocating die and a valve which forms part of the control mechanism, said valve being operated by the completion of the parting operation to give a start signal to the part of the control mechanism which influences the engagement of the feed pawl in the intermittent motion device.

Preferably the control mechanism is a pneumatic and the check pawl operates a valve which provides a pneumatic signal to a ram which actuates the dial feed pawl of the control mechanism. Although in this apparatus control is effected entirely pneumatically it will be understood that the control mechanism could be hydraulic or electrical or a combination of these.

One embodiment of the invention will now be described with reference to the accompanying drawings in which:

Figure 1 is a plan of a stud component;

Figure 2 is a plan of a wall plate;

Figure 3 is a schematic side elevation showing some parts in section;

Figure 4 is a side elevation of part of the intermittent motion device;

Figure 5 is a side elevation of a composite forming roller;

Figure 6 is a plan of part of the control mechanism and;

Figure 7 is a side elevation of the mechanism of Figure 6.

Referring firstly to Figures 1 and 2, the stud 2 is of channel section with a floor 4 and wall 6. The floor has

circular perforations 6 for conduit, cable and pipes, anchorage perforations 10 and tongues 12 at both ends. Similarly the plate 14 has a floor 4, walls 6, circular perforations 8 and pairs of slots 16 to receive the stud tongues 12. The slots are spaced at 75 mm intervals.

Referring now to Figure 3 the apparatus falls into five main sections, a forming section 18, a perforating station 20, a cutting and swaging station 22, an intermittent motion device 24 and a control mechanism including a pneumatic system (not shown specifically) for actuating various rams throughout the apparatus.

The drive arrangement includes a motor 26 which drives a gear box 28 which in turn supplies drive to each of the other sections. Referring to Figures 3 and 4 firstly an eccentric 30 drives rocker 32 upon which feed pawl 34 is mounted. Feed pawl 34 engages rachet wheel 36 imparting intermittent feed motion thereto so long as ram 38 allows the ball to contact the rachet teeth. Rachet 36 is on shaft 40 and a chain wheel (not shown) on the same shaft synchronously drives all the forming rolls 42 via a common chain. Each roll (see Figure 5) has a keyed roll 44 and idler flanges 46.

The intermittent motion imparted to the rollers 42 draws flat galvanised steel strip 48 from a coil (not shown) and feeds the strip in increments of 75 mm throughout the roll section which gradually forms and feeds the channel section material 50 to the perforating station 20 where the dies 52 close when the feed is interrupted. A ram 44

actuates the cancelling block 54.

The perforator 20 only operates during the manufacture of wall plates but when it does so part of the pneumatic system keeps the perforator operating continuously until parting occurs. Scrap discs and slot punchings fall down chute 56.

When set up to manufacture studs the cutting and swaging section 22 produces the diagonal bracing hole, twin tabs 12, twin perforations 8, swaged ends and the parting line between adjacent studs. When set up to make wall plates the dies are exchanged for dies that merely part adjacent plates. This section is operable independently of the remaining sections in order to turn out accessories such as clips and connectors but ordinarily the dies 58 open and close when the feed of the intermittent motion device is interrupted because they are reciprocated by a drive from the gear box 20 but at a periodicity which is selected by the control mechanism.

The control mechanism is mainly housed in a console at one side of the machine. Referring now to Figures 4, 6 and 7, the intermittent motion device is responsible for supplying pneumatic pulses to the control mechanism. A follower 60 opens and closes a pneumatic valve 62 (see Figure 4) and also acts as a check pawl in that it prevents backlash during starting and stopping. The regular pulses of air cause ram 64 to reciprocate arm 66. A pawl 68 carried on the arm and the pawl engages a rachel wheel 70 which advances step wise in an anti-clockwise direction

against a balance pawl 72. Pneumatic valve 74, 76 are actuated by levers 78, 80 for a purpose to be described.

Referring especially to Figure 7, shaft 82 is slideably mounted in housing 56. The end of shaft 82 carries a dial wheel 84 with radial pairs of holes 86, 88 each marked with multiples of 75 mm such that each increment of rotation of the wheel represents the feed distance travelled by the continuous as yet unsevered material. The dial wheel 84 is connected for rotation in unison with a rachet wheel by a pin (not shown). The shaft 82 can be lifted by push rod 90 of the ram 92 so that the dial wheel disengages with the rachet wheel and returns under the influence of a rack 94 and pinion 96 again moved by ram 98. The dial wheel carries two removable fingers 100 (only one shown) one for each row of holes 86, 88. These strike the arms 78, 80 of the valves 74, 76 and actuate the perforator 20 and the swage and cutter dies 22 respectively.

The apparatus works as follows. To make studs the appropriate tools are bolted into the press section 22. The pneumatic system is charged. The feed pawl 34 is disengaged by ram 38. The perforator is cancelled by ram 44. The dial wheel 84 is returned to START and the finger 100 is located in the hole which indicates 2400 mm. The motor 28 is started and the flat strip 48 is manually offered up to the feed rolls. Once the feed pawl is engaged the forming rolls advance the strip in 75 mm increments at a rate of about 8400mm/minute toward the cutting and swaging station 22. The rachet wheel 70

revolve stepwise 32 times at which point the finger 100 strikes valve 76 which causes the cutting and swaging dies too close. The same valve also actuates around 92 which separates the dial wheel from the rachet wheel and causes the rack and pinion to reset the dial wheel to START. After the dies 58 close their reopening operates a valve which causes re-engagement of the feed pawl 34.

When plates are being produced the dies 58 are exchanged for a parting die and the perforator is set to operate continuously. Both fingers are positioned in the dial wheel. Upon actuating valves 74 and 76 the perforator is interrupted and the parting dies close 5 mm beyond the last perforation.

I have found the advantages of the above embodiment to be that the machine turns flat galvanised strip of about 1.2 mm thickness into frame components in one pass at a feed speed between 6 and 10 m per minute. Persons with only minimal machine minding ability can change or check the component lengths easily by changing the position of the pin in the dial wheel. The tools in the cutting and swaging section can be interchanged so as to produce accessories such as clips, joint pieces and the like. The apparatus is mechanical and pneumatic in operation and is therefore repairable by operatives with no electrical skills.

The Claims defining the invention are as follows:

1. Apparatus for forming channel section building frame components from flat metal strip comprising a series of forming rolls for rolling a strip into the desired cross-sectional formation, a parting station which parts a predetermined length of said material from the continuous length travelling through the forming rolls, a perforating station located between the forming rolls and the parting station and a control mechanism for causing the forming rolls and the station to operate in a desired sequence.

2. Apparatus as claimed in claim 1 wherein a train of pairs of forming rolls is driven by an intermittent motion device, the train including an input end pair, an output end pair and at least one intermediate pair, the drive from the intermittent motion device being coupled to said intermediate pair and the remaining roll pairs being driven from the intermediate pair.

3. Apparatus as claimed in claim 2 wherein the intermittent motion device has a means to disengage the drive from the device to the forming rolls.

4. Apparatus as claimed in any one of claims 1 to 3, wherein each roll includes a central driven section which defines a nip with the corresponding central section of the roll pair and two idling forming flanges, one at each end of the section which flanges are not driven.

5. Apparatus as claimed in claim 4 wherein the driven section of the intermediate roll pair which is coupled to the intermittent motion device, is axially serrated.

6. Apparatus as claimed in any one of claims 2 to 5 wherein only one roll of each pair is driven.

7. Apparatus as claimed in any one of claims 3 to 6 wherein the intermittent motion device includes a rachet wheel which is rotated by the feed motion of a feed pawl in turn supplied by eccentric motion from a main drive, said feed pawl being movable under the influence of the control mechanism between a feed position in which it rotates the rachet wheel and the dwell position in which the feed pawl is held clear of the rachet wheel allowing the eccentric motion to continue.

8. Apparatus as claimed in claim 7 wherein a check pawl co-operates with the rachet wheel to prevent backlash when the feed pawl is disengaged.

9. Apparatus as claimed in any one of claims 1 to 8 wherein the perforator station includes a receiprocating die and an override for cancelling the perforation action while allowing the receiprocating motion to continue.

10. Apparatus as claimed in claim 9 wherein the perforator die comprises a static die and a reciprocal die and a reciprocable platen for applying punching pressure to the reciprocable die said platen having a die cavity and being movable by the control mechanism between a cancel position in which the die registers with the cavity and a punch position in which the platen drives the die.

11. Apparatus as claimed in any one of the preceding claims wherein the control mechanism includes a dial wheel which is rotatable step wise, synchronously with the

intermittent advance of the material, a pin locatable at any one of a number of positions around the wheel circumference which corresponds to lengths of through put of the material, a switch operable by said pin to activate both the parting tool and a wheel return mechanism for returning the wheel to start at the end of the parting operation.

12. Apparatus as claimed in claim 11 wherein the control mechanism includes a slidable shaft carrying the dial wheel, a pinion on the shaft spaced from the dial wheel, a rachet wheel co-axial with the shaft being rotatable by a dial feed pawl which receives feed motion synchronous with the motion of the intermittent motion device and a shaft slider for moving the shaft between an index position wherein the dial wheel is in driving connection with a rachet wheel and a recovery position wherein the dial wheel is disengaged from the rachet wheel which is under the influence of a driven rack strip which meshes with the pinion and returns the drive wheel to a restart position.

13. Apparatus as claimed in claim 12 wherein the shaft is upright and the shaft slider is a pneumatic ram.

14. Apparatus as claimed in any one of claims 11, 12 or 13 wherein the switch is a valve forming part of the control mechanism which provides a signal for both the disengagement of the feed pawl supplying intermittent feed to the material, the initiation of the parting operation and where appropriate, the interruption of the perforating operation.

15. Apparatus as claimed in any one of the preceding claims wherein the parting stationing includes a reciprocable die and a valve which forms part of the control mechanism, said valve being operated by the completion of the parting operation to give a start signal to the part of the control mechanism which influences the engagement of the feed pawl in the intermittent motion device.

16. Apparatus as claimed in any one of the preceding claims wherein the control mechanism is pneumatic and the check pawl operates a valve which provides a pneumatic signal to a ram which actuates the dial feed pawl of the control mechanism.

17. Apparatus as claimed in any one of the preceding claims wherein the parting station includes a swaging die.

18. Apparatus substantially described with reference to and as illustrated in the accompanying drawings.

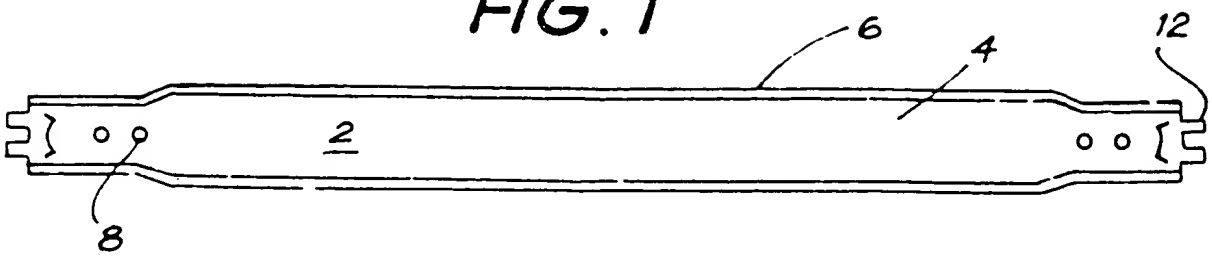
DATED this 5th day of September, 1980

NOEL CLAIR,

By His Patent Attorneys,

ARTHUR S. CAVE & CO.

FIG. 1



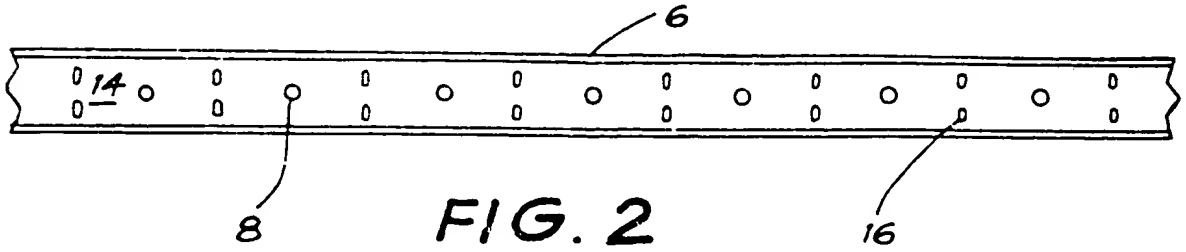
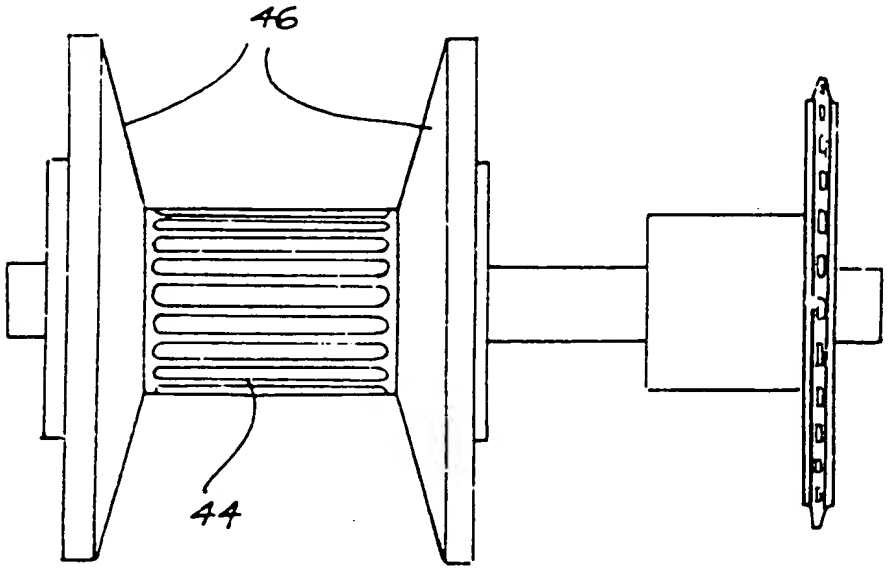


FIG. 2

FIG. 5



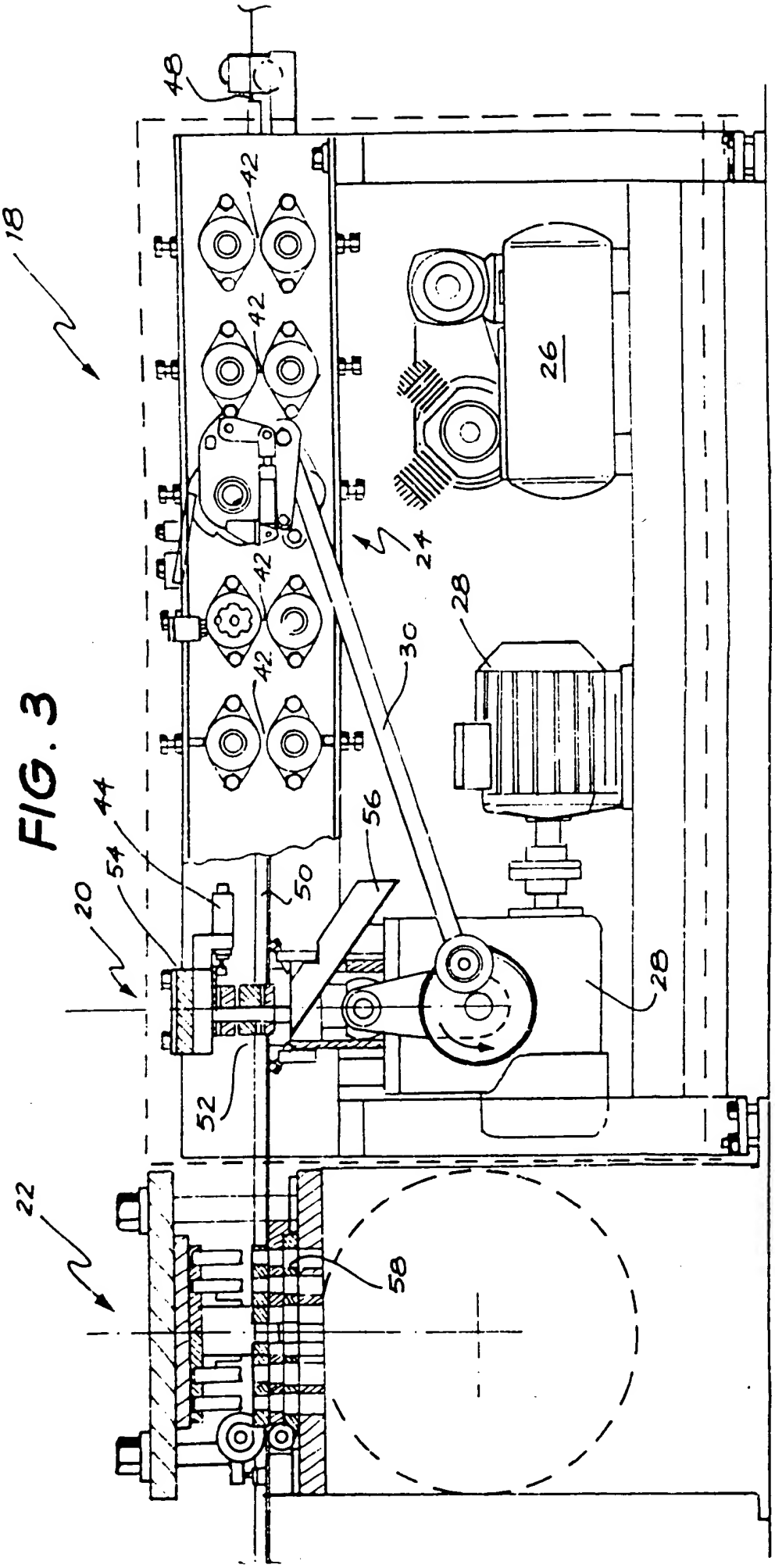
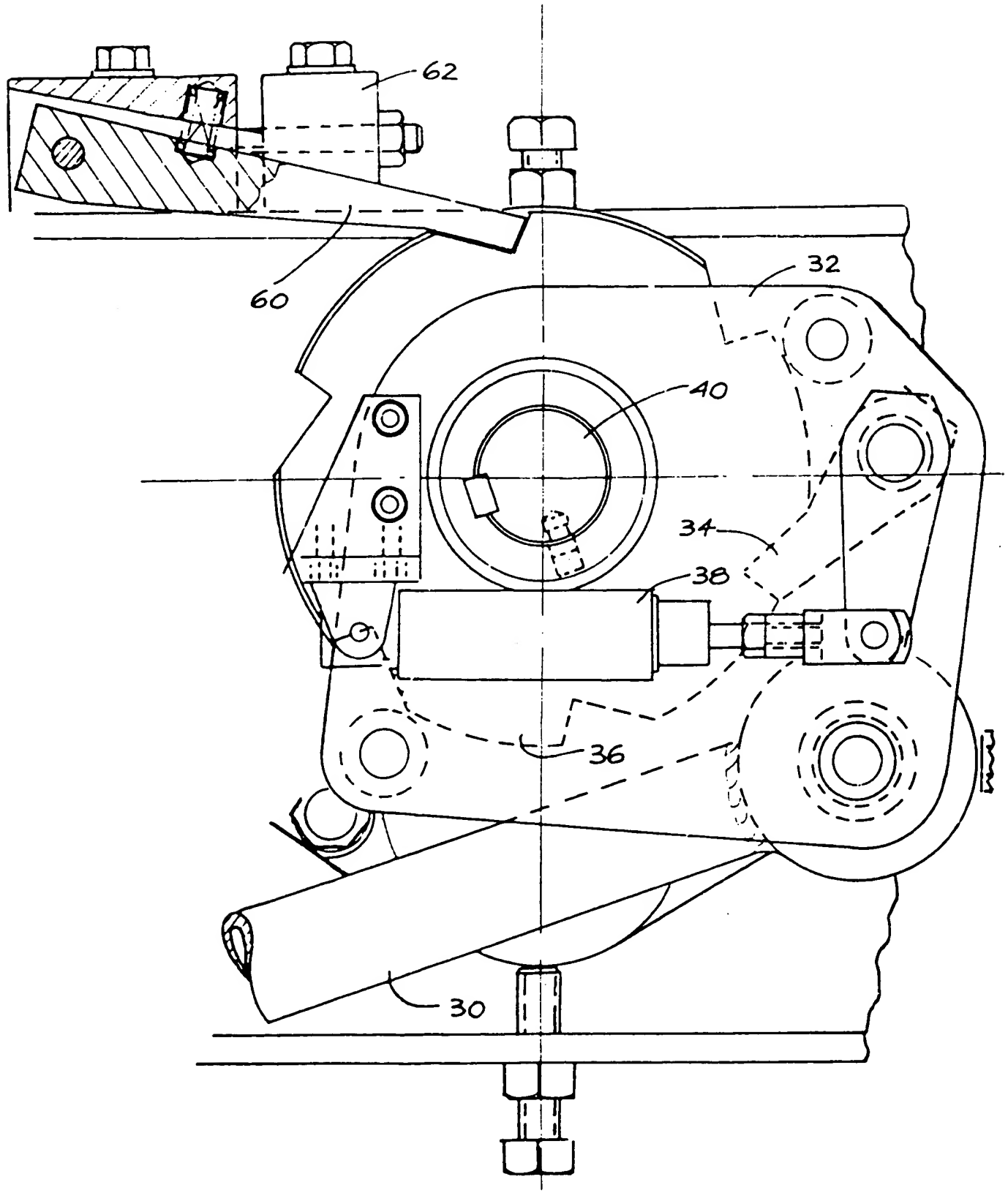


FIG. 3

FIG. 4



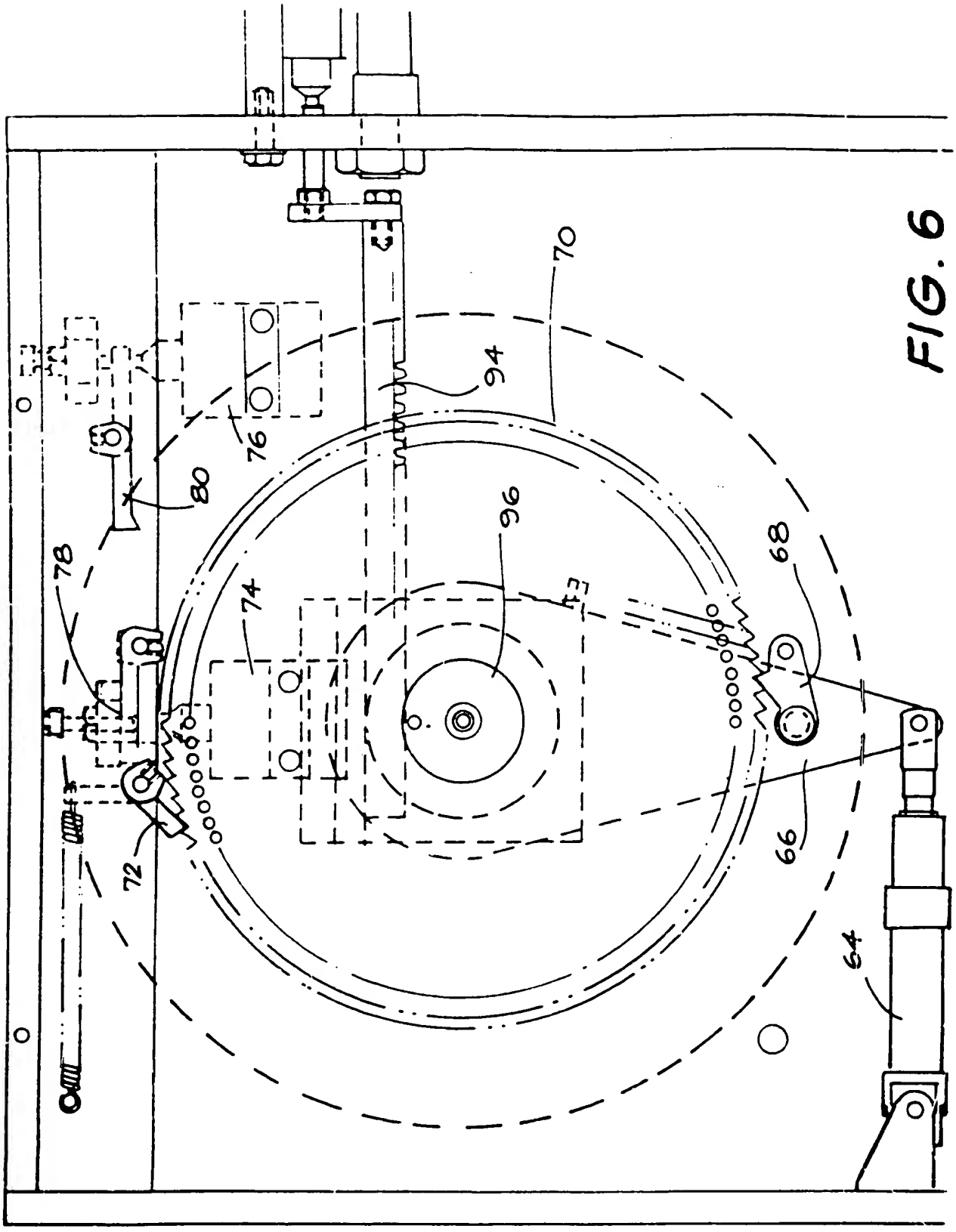


FIG. 6

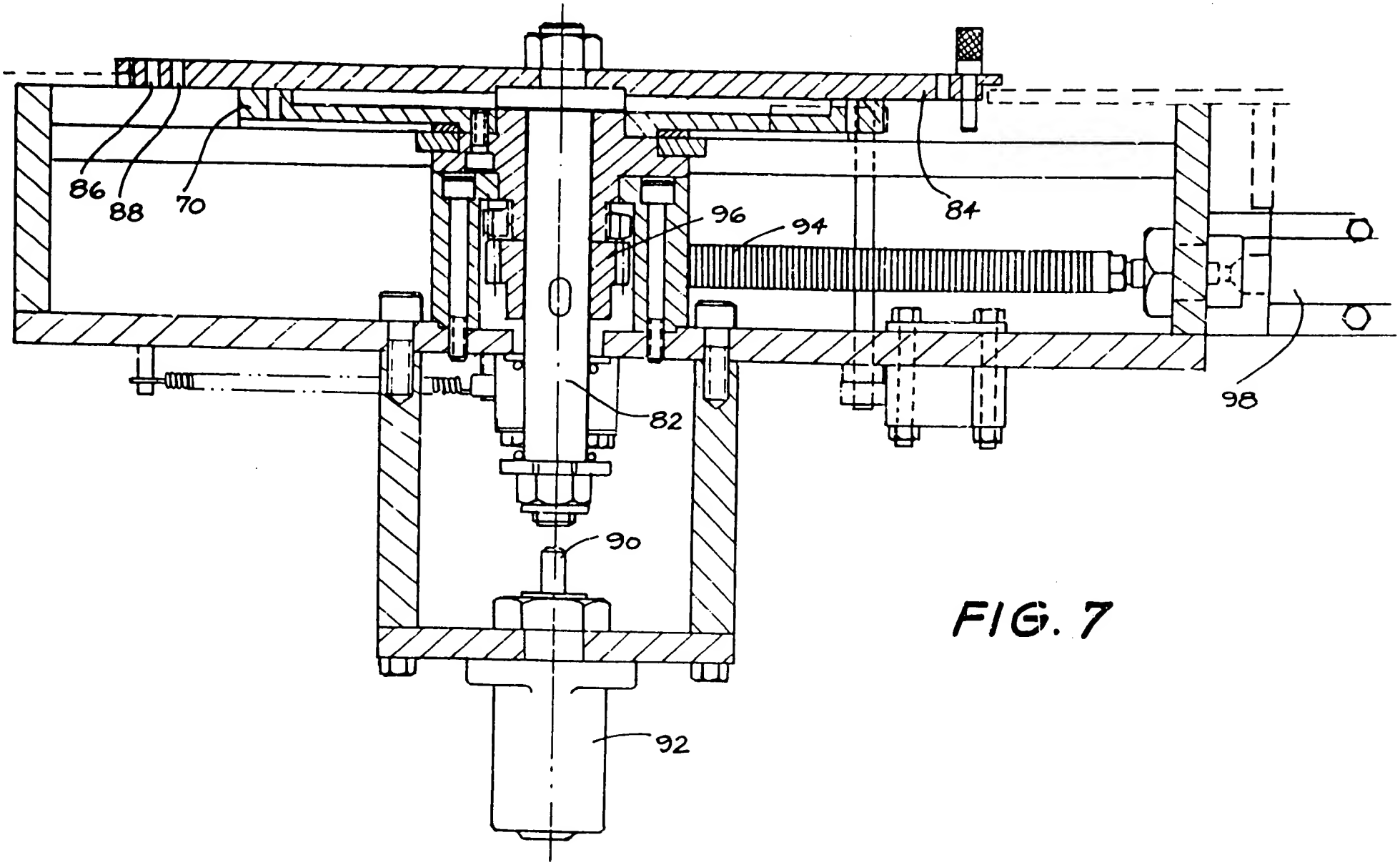


FIG. 7